Evaluation and Development of Diamond Grids for Ion Optics

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Abstract

A research program is under way to establish the feasibility of fabricating 15 cm diameter ion engine optics from polycrystaline diamond film. Because of its high thermal conductivity, low CTE, and low sputter yield, diamond film has the potential of mitigating life limiting and performance degrading processes which have hindered flight qualification of ion thrusters to date, Sputter yields at various incident ion energies have been measured and are reported. Two techniques are evaluated for growing diamond grids with holes. In one process the film is grown directly on a moly screen as the substrate. In the second process, the diamond is selectively deposited on a SiO_2 masked silicon substrate. Results of these experiments are reported.